VACUUM WINDOW GROUP ACTIVITIES

Period 9-7-62 to 9-13-62

Ultrasonic Welding

Some difficulty was experienced in using the new A-55 titanium for scab material. A program to determine whether or not it can be used has been started. Judging from the past two days' results, with the proper operating parameters it will work nicely. We have successfully welded approximately 80 consecutive inches of the leak tight seams on 3" x 6" and 7" x 10" pillow samples. Parameters used vary slightly from those which gave good results with the "old" B120-VCA titanium. Work will continue on more 7" x 10" pillows until we are confident that the results will be usable, as our good frames are extremely limited in quantity.

We are obtaining better seams with the new "250 W" generator.

Induction Brazing

Parameters and techniques for the bellows to invar frame braze are progressing but not as yet finalized. A jig has been fabricated for making gold braze rings for this braze but must be tested on a more powerful press than we have at this facility.

A test coil and jig have been made for practicing the brazes to the block and pump.

Hydrogen Braze (Frame)

The 7 x 10 brazed frame production was reinstituted at Willimantic. The various jigs, cleaning procedure and assembly procedure were reviewed and the necessary corrections and modifications were made to assure tight frames. Delivery is to start by the first of next week. Some delay was experienced due to furnace difficulties in the early part of the week.

25X1

[redacted] The modification of the 14 x 20 brazing jig is almost complete. expects to go to Willimantic next week and produce 14 x 20 frames.

Work was started on a second 14 x 20 brazing jig. This will allow increased production.

Assembly and cleaning instructions for the 7 x 10 and 14 x 20 frames were completed and are to be used by the assembler at Willimantic.

Drawings were completed for a manifold and base plate for the vacuum checking of the 14 x 20 frames.

We have been informed by Quality Heat Treat that they are purchasing a large electric retort furnace. It is expected to be ready in four to six weeks. We are informed that this furnace will give results superior to the furnaces used previously. This may help solve our invar surface resistance problems experienced in the past.

Resistance Bridge and Weld

Because of the grayish cast left on our invar samples by the large furnace at Quality Heat Treat, a search has been made for another vendor with facilities that could accommodate our 14 x 20 unit and braze with no discoloration of the metal. To date, three samples of invar and our brazing alloy have been sent to three shops. One set has been received from Eastern Heat Treating Company, Glen Cove, Long Island. The pieces were bright and the alloy wetted nicely.

The technician working part-time for us at Taylor-Winfield has abraded the invar material treated in the large furnace at Quality Heat Treat, Willimantic. He has found that surface resistivity of this material is equal (average value) to that of the material treated in the smaller furnace. Thus, we may be able to abrade the products of the conveyor furnace at Quality Heat Treat to a resistivity weldable at Taylor-Winfield. Determining and briefing another vendor would not then be necessary.

We have arranged to borrow an air and abrasive device to abrade our invar. The unit, if satisfactory, will increase productivity and improve abrading quality.

A low resistance bridge has been ordered to replace the unit plagued with thermocouple effects. The unit, 2% accuracy from 1 to 750,000 $\mu\Omega$ will be used in conjunction with the glass breaking machine. The latter has been modified and fitted with copper electrodes and a metal coupon holding jig.

The seam welder at Taylor-Winfield has not been available this week. The unit was removed from the original location and installed in the new lab. Taylor-Winfield has been running tests on the unit since it has been installed. They will continue testing through Thursday. 25X1 [redacted] expects to have access to the welder tomorrow to weld pillow samples.

Vacuum Calculations

A calculation has been made on the required pump speed if elastomer O-rings were used to make the seal. The calculation used simplifying assumptions to get an order-of-magnitude figure. These assumptions were made in such a manner that the minimum pump speed was obtained. On obtaining more complete data on elastomer outgassing and permeability a much more accurate calculation can be made.

VACUUM WINDOW GROUP ACTIVITIES

Period 9-14-62 to 9-20-62

Ultrasonic Welding

We have been able to get very good welds as far as wetting is concerned using the A-55 titanium for scab material. We have observed that there seems to be more chipping in the plate glass pieces recently, and we are attempting to determine whether this is a function of glass or a function of the new type of scab material. Considerable time was spent investigating weld quality for aluminum cleaned by various techniques. We are finding very surprising results which we still do not have an explanation for.

Induction Brazing

Procedures and parameters for hydrogen-induction brazing the vacuum pump to the block and the tubulation to the block have been established and tested. Vacuum tight brazed joints were made on test pieces.

A jig for flatening gold washers which are used in making the bellows to invar braze was completed and tested. It produces washers which appear to be satisfactory, but not optimum. We are in the process of doing test welds on this configuration.

Hydrogen Brazing (foil)

The 7 x 10 foil brazing production which was reinstated on September 4 at Quality Heat Treat has again produced discouraging results. First of all they were plagued with furnace trouble and had to replace a coil. They were slow in getting production started again, and when they did, they produced to date one foil which was leaky. This leak was reported by [redacted] who is at Quality Heat Treat at the present time.

25X1

All the jigging modifications on the 14 x 20 foil jigs were completed and on Tuesday, [redacted] went to Quality Heat Treat. They supervised the production by Quality Heat Treat personnel of 7 x 10 frames, 3 of which had been made in the last 3 days. These appear tight from visual observations. They have also assembled and brazed two 14 x 20 frames which also appear to have a high likelihood of being tight.

25X1

The necessary testing jigs for vacuum testing the 14 x 20 foils were returned from Ohio, and the necessary bell-jar setup for testing the 14 x 20 foils is nearly complete here in our laboratory.

25X1

If the visual observations are correct, as reported by [redacted] it appears that we are at the point where we can begin on a fairly high reliable basis to produce 14 x 20 foils.

Resistance Welding

Experiments have been carried out which have shown that with abraded cleaning methods the invar produced by either the pusher or the hump-back furnace at Quality Heat Treat can be made to a sufficiently low surface resistance and uniformity to be welded to aluminum. A surface resistance bridge was borrowed from Spot Welders in Stratford for several days and a bridge suitable for our use has been purchased and is expected to be in operation by the middle of next week.

Several chemical cleaning methods for invar have been tried and found to give resistance values comparable to the abraded cleaning methods for pusher type furnace material. These cleaning procedures will be tried on the hump-back furnace specimens.

25X1

Material and instruments were sent to [redacted] at Taylor-Winfield. He has made a quantity of 14 pillow samples for us, four of which were using material annealed in the hump-back furnace and ten of which were made using material using the pusher furnace. These pillow samples were made in a manner whereby heat was reduced half way through the welding, to minimize the possibility of burn through the overlap. These samples are in the mail to us, and have not yet been checked, but appear from all visual observations to be good.

We have received samples of material brazed in other facilities, and have the means to evaluate three other possible vendors for doing the hydrogen brazing of the foils should the hump-back furnace at Quality Heat Treat prove inadequate.